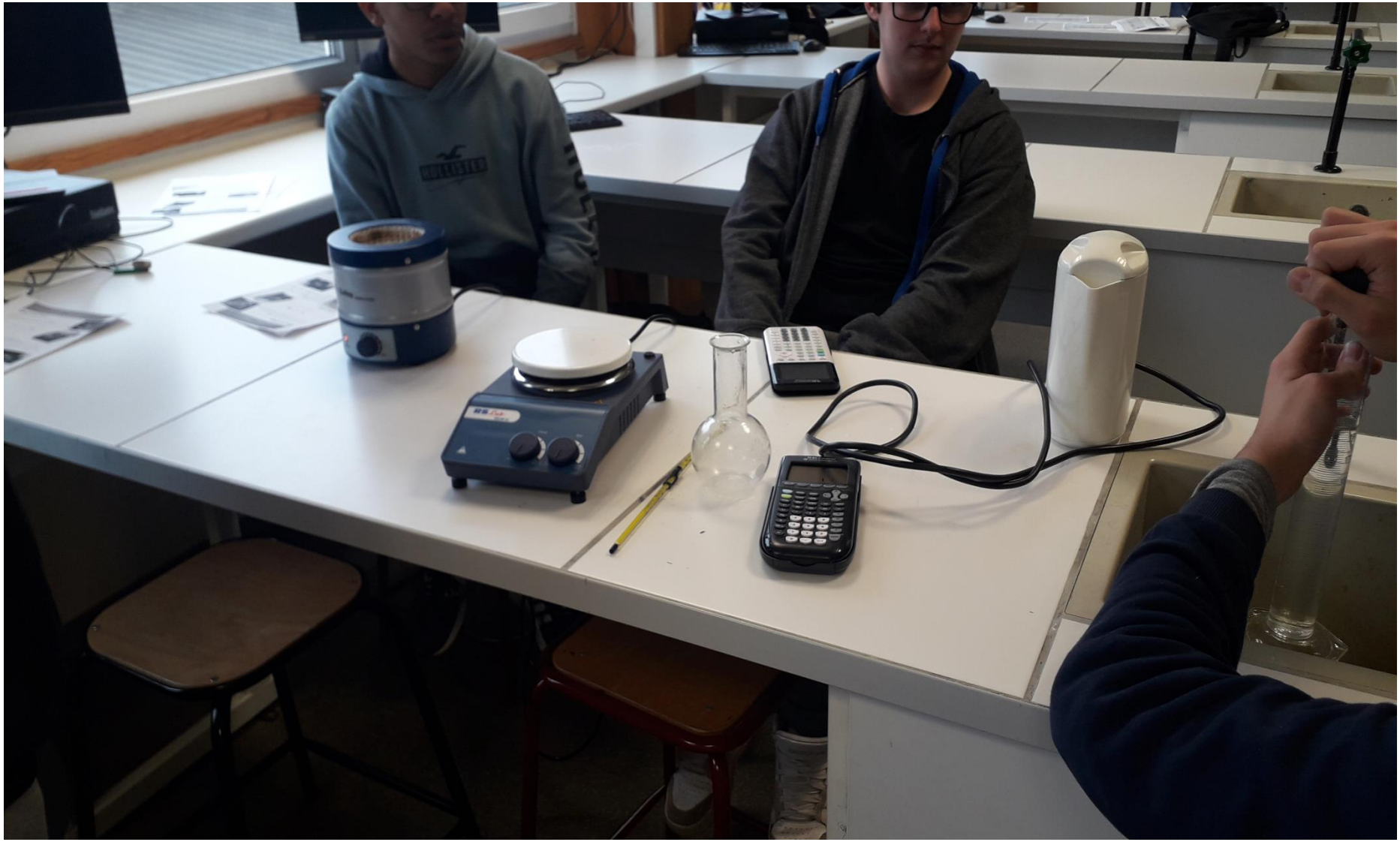
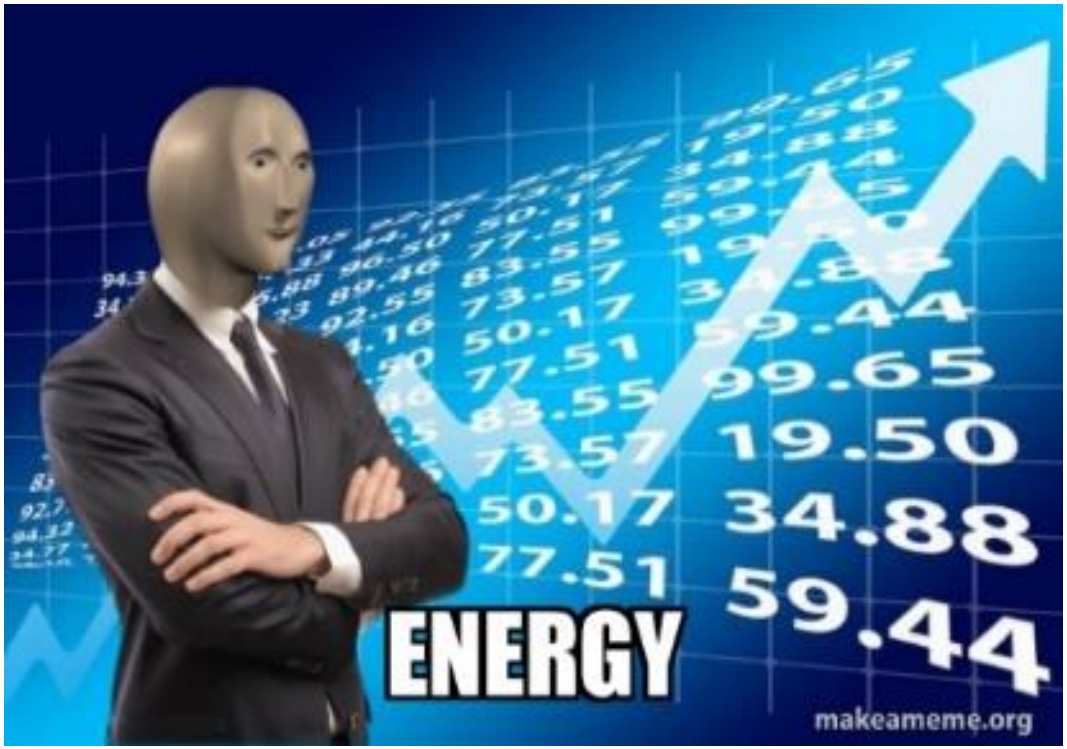
PRESENTATION OF THE EXPERIENCE

Cité scolaire Béhal
Savoir faire de Lens



Practical work :
What’s the best way to heat water?



1) <u>Hotplate's energy efficiency</u>

At First, we need power value which is on the hotplate to know how much energy the hotplate is spending (power unit is the Watt).

P = ……W

<u>The experimentation:</u>

Heat the hotplate for a few minutes at maximum power.

Meanwhile pour into a flask 200 ml of water, using a graduated cylinder.

Note the initial temperature (It) of the cold water by using a thermometer:

It =

Heat the 200 ml of water during exactly 5 minutes at maximum power.

After 5 minutes, remove the flask from the hotplate.

Shake before raising the temperature of the hot water.

Ft =

Note the final temperature (Ft) of the hot water by Using the thermometer:

<u>With these results, we can find hotplate's efficiency!</u>

Calculation of electrical energy consumed during 5min:

Reminder: $E_{electric}$ = P ***(power)*** x t ***(time)*** with E in watt.min

$E_{electric}$ =

Give the value of $E_{electric}$ in Joules ***(x 60)***

Calculate water's thermal energy $E_{thermal}$

Reminder : $E_{thermal}$ = w ***(weight)*** x c ***(capacity = 4180 J.kg^{-1} .K^{-1})*** x (Ft-It)

$E_{thermal}$ =

Finally, we can calculate hotplate's efficiency!

$Ef_1 = (E_{thermal} / E_{electric}) \times 100$

Conclusion

2) Heating mantle's energy efficiency

Now, we'll do the same experimentation but with a heating mantle:

Power value (watt)	W
Initial temp. (It)	°C
Final temp. (Ft)	°C

With these results, we can find hotplate's efficiency!

Calculation of electrical energy consumed during 5min:

Reminder : $E_{electric}$ = P ***(power)*** x t***(time)*** with E in watt.min

Give the value of $E_{electric}$ in Joules

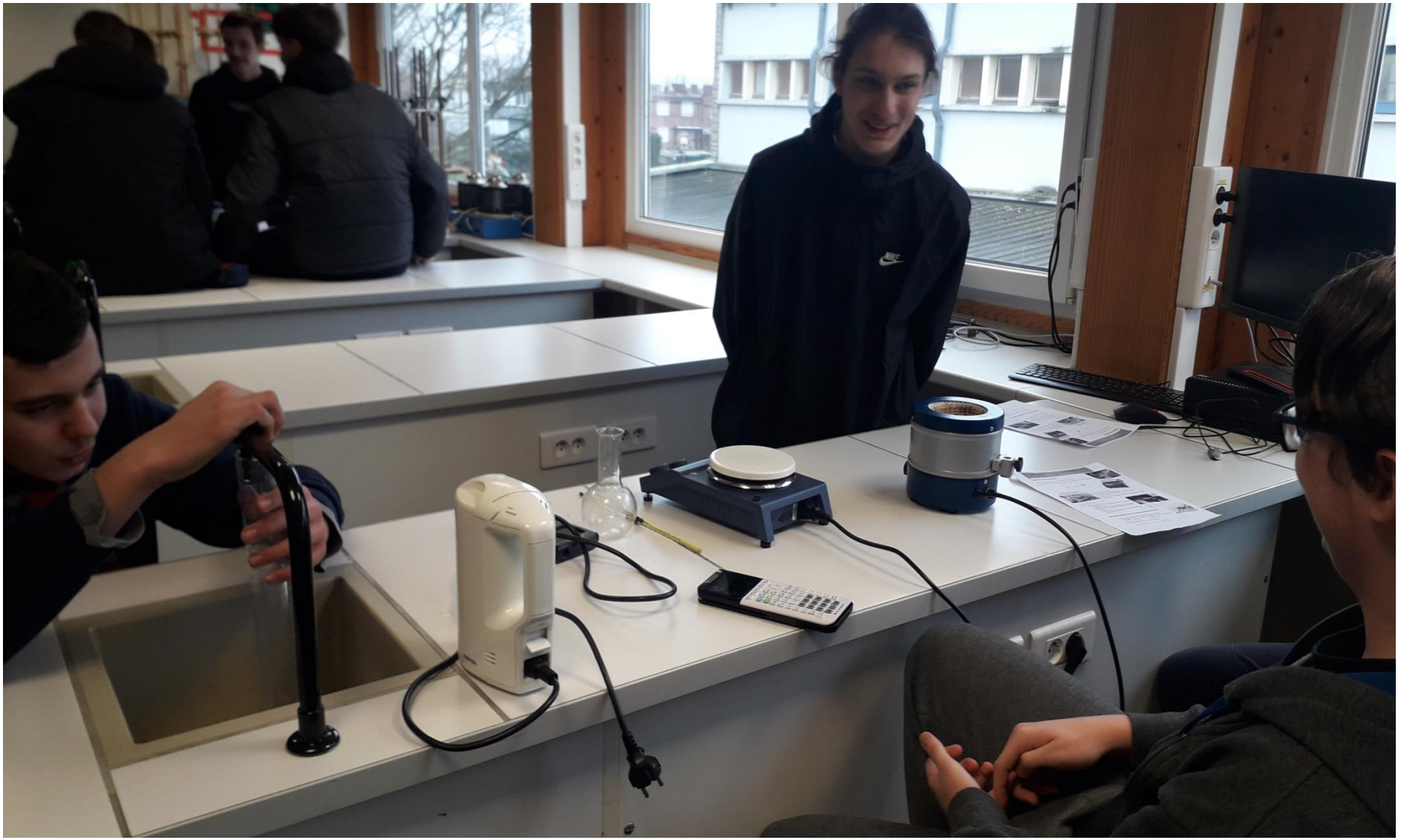
Calculate water's thermal energy $E_{thermal}$

Reminder : $E_{thermal}$ = w x c ***(= 4180 $J.kg^{-1}.K^{-1}$)*** x (Ft-It)

Finally, we can calculate heating mantle's efficiency!

$Ef_2 = (E_{thermal} / E_{electric}) \times 100$

Conclusion



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Funded by the European Union

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